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OF THE
AMERICAN ASSOCIATION
OF CEREAL CHEMISTS

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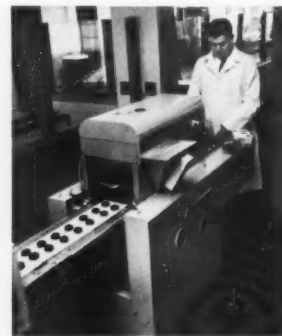
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THE VITAL STORY OF Breakfast Cereals

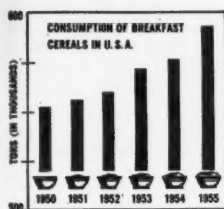
with essential vitamins and minerals restored

by Science Writer

New Edition

AMERICA LIKES BREAKFAST FOODS

Let no one doubt the popularity of breakfast cereals among Americans. The chart below traces the consumption of these fine foods between 1950 and 1955. During that period annual consumption rose by 76,000 tons. In just one year, 1955, Americans ate 2½ lbs. of hot and 4.8 lbs. of cold cereals per person!



Why are breakfast cereals so well-liked? They are tasty; they are easily served; they appeal to busy homemakers, as well as institutional dietitians, because they are readily available in a variety of flavors at a modest cost. They add interest and value to an important but sometimes neglected meal—breakfast. Their use is extending to between-meal and party snacks, too.

Many grains are processed to make breakfast cereals: wheat, corn, oats, rice. Eaten with fruit and milk or light cream, they contribute an excellent combination of basic, flavorful, nutritious foods to the diet.

Better Foods for Better Health Through Restoration

The science of nutrition has advanced rapidly. In the manufacturing process of some cereals, some of the essential "B" vitamins and minerals are subject to some loss, just as with other foods.

These losses are inescapable when such grains are prepared for human use. When this became known, manufacturers acted to overcome the losses. They adopted restoration.



Restoration simply means that certain important vitamins and minerals are restored to the cereal food during processing, so that the vitamin and mineral values in the finished product are generally equal to the whole grain values of those elements. Wheat, corn and rice products are customarily so treated. Vitamins B₁ (thiamine), B₂ (riboflavin), niacin (another "B" vitamin), and the mineral, iron, are those most widely restored. Vitamins C and D are also sometimes added.

Pre-sweetened cold cereals emphasize the nutritional importance of added vitamins. Increased calories require more "B" vitamins for best utilization of the food.

Why the Vitamins are Important

Physicians and diet experts have proved that vitamins are essential to prevent certain deficiency diseases and to contribute to robust good health.

Vitamin B₁ (thiamine) helps build and maintain physical and mental health. It is essential for normal appetite, intestinal activity, and sound nerves. A lack of this vitamin leads to beriberi, a rarity in the U. S. A., but still a very serious health problem in other parts of the world.

Vitamin B₂ (riboflavin) is essential for growth. It helps to keep body tissues healthy and to maintain proper function of the eyes.

Niacin is needed for healthy body tissues. Its use in the American diet has been largely responsible for the virtual disappearance of pellagra, a serious disease.

Vitamin D helps children develop normal teeth and bones. It prevents the development of certain abnormal bone conditions in adults.



Iron is essential for making good red blood and for the prevention of nutritional anemia.

Where Do the Vitamins Come From?

At about the same time that processing losses in breakfast cereals became known, other developments in the scientific world made available ample supplies of vitamins at economical prices. Thus, the nutritional contribution of some breakfast cereals could be, and was, greatly improved through restoration.

Since the early days of breakfast food restoration and of white flour and white bread enrichment, the world-famous firm of Hoffmann-La Roche has supplied top quality vitamins by the tons. Pioneering work in its laboratories and by its collaborators resulted in the "duplication" of some of nature's extremely complex substances. First, the chemical composition of the vitamin was learned. Second, the pure substance was isolated. Third, the "duplicate" was made by synthesis. And fourth, the laboratory techniques were extended to large scale commercial operations.

The manufactured "duplicate" is identical chemically and in biological activity with nature's own product. A vitamin is still a vitamin regardless of whether nature or man made it. So efficient is large-scale manufacturing, that vitamins are sold at a lower cost than if they were extracted from natural sources.



This article is one of a series devoted to the story of vitamin enriched or restored cereal products: white flour, white bread and rolls, corn meal and grits, macaroni products, white rice, breakfast cereals, farina. Reprints of this article, of any other in the series, or of all are available without charge. Please send your request to the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 1956 Bourdon Street, St. Laurent, P. Q.

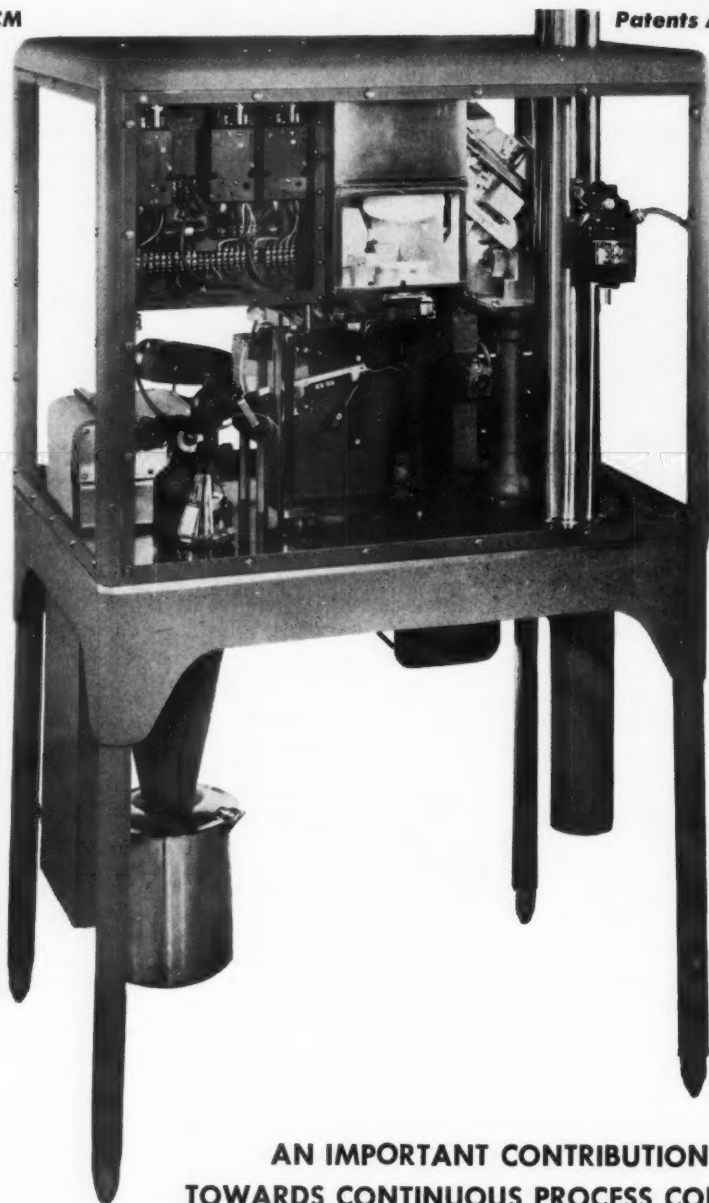
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CEREAL SCIENCE

Today

FEATURES

- The Nutrition Foundation, Inc. Horace L. Sipple 55
AACC's 43rd Annual Meeting 58

TECHNICAL SECTION

- Some Microscopic Changes in the Aleurone Layer of Wheat During
Conditioning. M. Momtaz El-Gindy and W. Schaefer 61

DEPARTMENTS

- Editorial 53 President's Corner 65
Baking Technology 64 AACC Local Sections 66
People, Products, Patter 67

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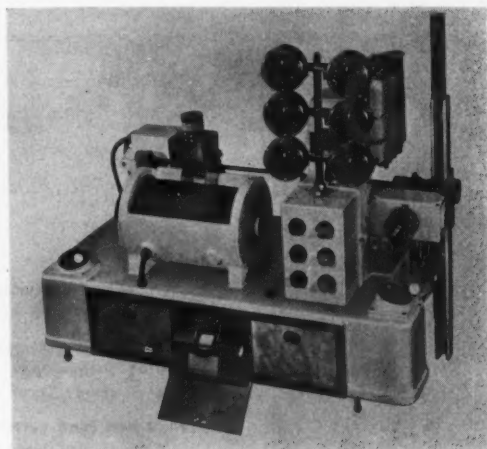
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American Association of Cereal Chemists meeting
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Editorial

MEASURING, DESCRIBING, AND specifying quality in raw materials and finished products is an important responsibility of technically trained personnel in many branches of industry, including those engaged in the processing of cereal grain products.

Though it is frequently described in well-defined and generally understood terms, quality is not usually an absolute attribute. Where several barometers are used to describe something, their relative importance is likely to vary depending upon their magnitude, the intended end use, and the personal preferences of the user. Protein content may be determined in both bread and cake flours, but the connotation in each is different. Softness may be desirable in bread, but beyond a certain point it can become objectionable. The importance of color varies with individuals and with products; it may even change with time. Once celery could not be sold unless it was blanched; now it is more popular green. Custom places quite different emphasis on color in durum products and in bread flours. Enzyme activity, closely controlled within narrow limits, may be all-important in breadmaking but without significance in chemically leavened products. A wholesale baker with a highly mechanized operation will of necessity be far more cognizant of and concerned over nonuniformity in his ingredients than will most retail bakers.

Experts may develop and place great emphasis upon quality criteria that have little, or even negative, significance to consumers. Much attention may be given to physical conformation, to the neglect of flavor and other attributes of eating quality. Products may be accepted or rejected on the basis of tests that fail to reflect tolerance to normal deviations from optimum conditions.

Progressive companies constantly seek to raise standards of quality wherever possible. The development of newer, faster, more precise, or less costly techniques of measurement is a continual challenge to the technologist. Equally important may be frequent reappraisals of the definitions of quality, so as to be sure they are realistic in the light of current practices and preferences.

PAUL E. RAMSTAD

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**ORGANIZATION,
OBJECTIVES, AND
MODE OF OPERATION:**

The Nutrition Foundation, Inc.

**By Horace L. Sipple, Executive Secretary and Treasurer,
The Nutrition Foundation, Inc., New York, N. Y.**

LEADERS IN THE food and related industries have for many years taken serious interest in problems of nutrition and public health. They have accepted voluntarily a large share of responsibility for aiding in the solution of those problems. The Nutrition Foundation is one example of the industry's translation of this interest into concerted action.

The Nutrition Foundation, Inc., was organized by food and related manufacturers as a sincere expression of their interest in scientific progress and human health. A group of fifteen companies in these industries formed the Foundation in December 1941, to help meet the need for increased support of basic research and education in the science of nutrition.

Design of the Program

When establishing the Foundation, the representatives of industry and their advisory group of scientists, educators, and other civic leaders agreed that to be of the greatest value, the Foundation's program should be wholly in the public interest and fundamental in character. In pattern of organization and in purpose, the Foundation constituted a new type of development in the industrial and educational life of the United States and Canada. Subsequent experience has shown that the principles serving as the basis for its formation are fundamentally sound.

The Nutrition Foundation's research and educational program is designed to assist universities and medical schools in their basic studies of nutrition; to encourage advanced training of young scientists in university graduate and medical schools; to support sound educational measures of greatest benefit to the public; and to aid in the solution of nutritional

problems that are of major importance in human health.

Funds: Sources and Uses

Foundation membership has grown to fifty-seven companies. With the funds received under the membership plan, the Foundation provides grants to universities and medical schools in support of studies to gain a better un-

derstanding of human requirements of individual nutrients, of how the various nutrients function normally or may be related to breaks in health, and of how basic research findings may be made available to the public and to industry so as to afford the greatest benefit.

Research Areas

As of January 1958, expenditures and commitments amounting to more than \$4,800,000 have been made to university and medical centers in the United States, Canada, and Central America for projects in the following areas:

Research on human requirements of individual nutrients;

Research to find how the various nutrients function inside the body and how each can be measured accurately;

Research dealing with maternal and infant nutrition;

Research in which there is direct emphasis upon relationships between nutrition and health; and

Education beyond that provided by research grants to facilitate the application of new information.

The program is planned to maintain balanced support covering these research areas. Sixty-nine grants are currently active in support of projects at thirty-five institutions.

Scientific Advisory Group

The Nutrition Foundation enjoys the cooperation of distinguished research scientists in university and government positions who serve without compensation as members of its Scientific Advisory Committee. This Committee assists the Executive Director in reviewing and evaluating all grant applications and in evaluation of present and future plans for the program as a whole. The present members are listed on the next page.



Charles Glen King, Executive Director, The Nutrition Foundation, Inc.

derstanding of human requirements of individual nutrients, of how the various nutrients function normally or may be related to breaks in health, and of how basic research findings may be made available to the public and to industry so as to afford the greatest benefit.

Payments and future commitments into the Nutrition Foundation's regular budget now total more than \$6,400,000. In addition, supplementary funds totaling over \$720,000

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Executive Director
The Nutrition Foundation, Inc.

Applications receiving a sufficiently high rating are submitted by the Executive Director to the Board of Trustees with a recommendation for a grant allocation. Normally grants are approved in the spring for activation July 1, and in the fall for activation January 1.

Contributions to Nutrition

The recipients of Foundation grants have made and are continuing to make many important contributions to the science of nutrition with respect to proteins, fats, carbohydrates, minerals, vitamins, infant and maternal nutrition, dental caries, anemia, diabetes, nutritive factors affecting heart and vascular diseases, and new methods for appraising nutritional status and for the measurement of various nutrients and metabolic products. To cite a single example as an illustration, the classic work of Dr. William C. Rose at the University of Illinois, in identifying the amino acids that proteins must furnish to protect health in young human adults, was aided by a Nutrition Foundation grant.

Good liaison is maintained with other fund-granting agencies working in closely related fields, so as to avoid duplication and to allow the Foundation's program to be as effective as possible.

A most important second contribution made by the Foundation's program of grants is the greater opportunity afforded graduate students and post-doctorate scientists to receive special training in nutrition research and education. Such grants have helped make possible the advanced training of about a thousand young scientists.

The Foundation's educational program has included grants in support

of supplemental studies in community-wide education and in the development of improved methods for teaching nutrition in the schools at all grade levels. Two studies of methods for elementary grades are currently being supported.

Cooperative Activities

To help in distributing sound information on nutrition to the public through qualified professional organizations, the Foundation has undertaken a number of cooperative educational activities. A joint project has been established with the American Medical Association, through its Council on Foods and Nutrition, for publishing a series of articles written especially for the use of the practicing physician. A somewhat similar arrangement has been made with the American Dental Association through the offices of its Journal. The Foundation has joined with the American Dietetic Association, the U. S. Public Health Service, and the American Heart Association in assisting in the preparation of booklets on low-sodium diets.

Nutrition Reviews, a monthly review journal, was established by the Nutrition Foundation and has been continued since 1942, to supplement

the basic research publications and to make available short, critical appraisals of the world's current scientific literature. All major research journals dealing with nutrition are covered regularly by the editorial staff, themselves experienced and independent research scientists. The Foundation prepares and distributes to science writers and food page editors non-technical releases based on *Nutrition Reviews* articles and related material of particular importance and interest to the public.

Awards and Fellowship

To encourage interest in four of the professional fields most closely related to nutrition and to assist those organizations largely responsible for guiding the development of personnel toward high levels of achievement, four annual awards have been sponsored by the Foundation. Each organization is given independence with respect to the award. The awards are named in recognition of individuals whose accomplishments exemplify the ideals of the appropriate professional group. Awards during 1957 are shown in the box below.

Beginning in 1958, six nutrition research fellowships for medical students will be sponsored annually. These fellowships, in the amount of \$600 each, will be administered by the American Medical Association through its Council on Foods and Nutrition. The first awards will be made for the summer term of 1958.

National Advisory Body

To permit the Food and Nutrition Board of the National Academy of Sciences-National Research Council to function effectively as a national advisory body in the field of nutrition, an annual grant is made toward support of its operating budget.

The program of the Foundation includes cooperation with scientists and scientific organizations in other parts of the world. The Executive Director works closely with United Nations

(Please turn to page 60)

Award and Organization

Osborne & Mendel Award of the
American Institute of Nutrition
Babcock-Hart Award of the
Institute of Food Technologists
Mary Swartz Rose Fellowship of the
American Dietetic Association
Joseph Goldberger Award of the
American Medical Association

Recipient, 1957

George R. Cowgill
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Cincinnati offers an outstanding technical program, three prominent guest speakers, and a full schedule of interesting social events for the AACC's

43rd Annual Meeting

RETURNING TO CINCINNATI for its 43rd annual meeting, the American Association of Cereal Chemists has just announced an impressive, well-rounded technical program. Host to the meeting, to be held April 7-11 at the Netherland-Hilton Hotel, is the Cincinnati Section. General chairman for local arrangements is Ralph C. Lakamp of the Kroger Food Foundation in Cincinnati, and for the program, James W. Evans of the American Maize-Products Company, Roby, Indiana.



Ralph C. Lakamp

Guest Speakers

Three outstanding guest speakers have accepted invitations to address the opening session on April 8th. Discussing topics of immediate and vital interest to the Association, they are: R. G. Ruark, Vice-President Technical Division, Corn Products Refining Company, New York City; John P. Snyder, Jr., Vice-President in charge of Production, Pillsbury Mills, Inc., Minneapolis, Minnesota; and J. Le-

roy Welsh, President, Butler-Welsh Grain Company, Omaha, Nebraska.

Delivering the presidential address and sounding the keynote for the meeting will be AACC President William B. Bradley, Scientific Director of the American Institute of Baking in Chicago. Dr. Bradley is well known to AACC members. He has been with the Institute since 1945, then in the capacity of director of laboratories, and attaining his present position in 1950. Since joining the AACC in 1946, he has given the Association the benefit of his services on many committees, including Sanitation, Determination and Definition of Color in Eggs, Local Arrangements for 1950, Program Chairman for 1955, and others. At present he is a member of the Editorial Board.

Mr. Ruark will reveal to the association the "Future of the corn wet-



James W. Evans

milling industry." He speaks with benefit of an excellent background in this industry and can point with em-

phasis to last month's disclosure by Corn Products Refining Company's president, William Brady, of record expansion plans and optimistic outlook for 1958.

He was distinguished as a fellow (1932-41) and administrative fellow (1944-48) at the Mellon Institute, including in this period an assignment on the War Production Board (1941-44) as director of the Bureau of Aromatics and Intermediates. Joining Corn Products Refining Company in 1944 as director of research sales, he became assistant to the general manager of the chemical division in 1948, assuming his present duties as assistant to the president and vice-president, technical division, in 1952.

Mr. Snyder will find a most attentive audience for his report on "The future of the wheat milling industry." Mr. Snyder is a well-known figure in the flour milling industry, now vice-president in charge of production for Pillsbury Mills, Inc., with headquar-



R. G. Ruark



John P. Snyder, Jr.

ters in Minneapolis. He joined Pillsbury in 1935, working in Pillsbury A mill and the experimental mill in Minneapolis. Until January, 1952 he served in various capacities in the company's mills, for a time in Springfield, Illinois, later returning to Minneapolis, and at the time of his election as vice-president in 1956, he was general foreman of the A mill. He took leave of absence for military service during World War II, first with Army Ordnance and later in the Navy, entering as apprentice seaman, leaving as Lieutenant. He is a member of the Association of Operative Millers. Mr. and Mrs. Snyder and their three children live in Wayzata, Minnesota.

J. Leroy Welsh is a native of Nebraska and a well-known grain operator in Omaha. He is chairman of the Board of Regents of the University of Nebraska, and is serving actively as director on the boards of several



J. Leroy Welsh

financial and business institutions in Omaha as well as on the board of the Salvation Army and the National Aeronautics Association. His distinguished record includes service in World War I as a member of a Balloon Squadron.

A former president of the National Grain & Feed Dealers Association, the Omaha Grain Exchange, and the Ad-Sell League of Omaha, he was made chairman of the bi-partisan five-man Commission on Industrial Uses of Agricultural Products by President Eisenhower on August 22, 1956. This commission was formed under the provisions of the Agricultural Act of 1956.

Mr. Welsh's discussion of the "Report of the President's Bi-Partisan Commission on Increased Industrial Use of Agricultural Products" will be of particular interest to AACC members.

Technical Program

The preliminary technical program, carried in the February 1958 issue of CEREAL SCIENCE TODAY, includes more than 48 important papers. Once again, the wide scope and practical slant of these papers reflects the rapid strides cereal scientists the world over are making to solve the problems of their related industries. The final program was published March 7.

As suggested by the program chairman, the technical papers secured to date may be conveniently grouped as follows: chemistry and technology of flour; chemistry and technology of starches; baking and bakery products; wheat and wheat gluten; and general cereal science and technology.

Ten or more papers concerned with the CHEMISTRY AND TECHNOLOGY OF FLOUR offer valuable new data on many long-standing questions and problems. Of immediate interest to cereal chemists, particularly in the milling and baking industries, will be the contributions from J. W. Pence, H. S. Sokol, D. K. Mecham, and others at Western Utilization Research and Development Division, dealing with "Studies on the importance of starch and protein systems of individual flours in loaf-volume production"; "Content and reactivity of sulfhydryl groups in wheat flours and doughs"; and the "Effects of sulfhydryl-blocking reagents on the mixing characteristics of doughs." These industries will also be attentive to the report by P. J. Mattern and R. M.

Sandstedt of the University of Nebraska on the "Relation of the state of oxidation of a flour to its fermentation tolerance." Reporting from Canada's Grain Research Laboratory in Winnipeg, I. Hlynka and R. R. Matsuo establish "Proportionality between structural relaxation constants and bromate effect in dough." I. Hlynka and H. Matsumoto will report on "Distribution of the sulfhydryl group in wheat flour."

In separate reports K. A. Gilles of General Mills, Inc., and R. K. Bequette of Kansas State College, with their co-workers, will add insight into problems involving flour quality. J. C. Rankin *et al.* of Northern Utilization Research and Development Division will present the latest data on "Preparation and properties of hydroxyethylated cereal flours."

Considerable emphasis has been placed on the growing importance of starches in cereal science and the need for greater understanding of their complex physical properties. Seven or more papers on the CHEMISTRY AND TECHNOLOGY OF STARCHES reflect the practical aspect of these studies. From Purdue University, H. H. Kramer reports on "High-amylose corn," while R. L. Whistler presents "Microstructures in starch granules." Authoritative papers by W. R. Fetzer of Clinton Corn Processing Company; H. W. Leach of Corn Products Refining Company; and L. A. Wollermann of American Maize-Products Company deal with starch paste fluidities, swelling and solubility patterns of various starches, and properties of pregelatinized starches. In this area also the Northern Utilization Research and Development Division is contributing two papers dealing with basic research on corn and wheat.

Even a casual study of the subject matter of the papers to be presented under the last three groupings will tend to confirm the expected heavy attendance at the meeting of members actively employed in the cereal food industries. Researchers and technicians alike will be on hand to benefit from the more than two dozen practical papers. A number of the reports appear to be directly applicable to procedures and techniques now in general usage. Still other papers are reporting newer ideas and techniques which are rapidly becoming useful to the cereal chemist. Because of space limitations only a few

of these papers may be mentioned in detail, but this may serve to emphasize the variety and utility of the program.

In three comprehensive papers under BAKING AND BAKERY PRODUCTS H. F. Zobel, F. R. Senti, J. E. Cluskey, and N. W. Taylor of Northern Utilization Research and Development Division throw new light on "bread staling." Also reporting on this problem in "Staling studies of bread made with flour fractions" will be W. G. Bechtel of the American Institute of Baking, presenting the fifth of a series of papers dealing with this subject. "Microphotographic studies of doughs and baked goods" by E. Hanssen, H. Bahlsens Keksfabrik K.-G., Hannover, Germany, should complement these studies nicely. Employing other photographic studies will be a paper on the "Effect of heat on batters" by Eileen Brady and R. C. A. Bradshaw of Quaker Oats Company.

Reports on new procedures, additives, and products will include further studies on aspects of the "Brew process" of bread manufacture by J. W. Lee and W. F. Geddes of the University of Minnesota. E. G. Bayfield *et al.* of The Florida State University have explored the effect of "Gums and some hydrophilic colloids as bread additives." The Quartermaster Food & Container Institute for the Armed Forces will reveal details of two studies; one relating to the development of bread flavor precursors in yeast-fermented media, and the other to the development of the leavening system for an instant bread mix.

Under the division WHEAT AND WHEAT GLUTEN, R. A. Anderson, V. F. Pfeifer, and co-workers in two papers from the Northern Utilization Research and Development Division deal with the separation of gluten from wheat flour. Sing-ping Lai and others at Kansas State College and the Hard Winter Wheat Quality Laboratory, Crops Research Division, A.R.S., U.S.D.A., present further data on the "Treatment of wheat with ionizing radiations."

Considerable attention will be drawn to new analytical techniques based on nuclear chemistry and described in two papers originating at the Schlumberger Well Surveying Corporation in Ridgefield, Connecticut, in the division of GENERAL CEREAL SCIENCE AND TECHNOLOGY. J. Tittman will describe

"A nuclear method for nitrogen determination" and H. Rubin will discuss the utility of "Nuclear magnetic resonance analysis and research as applied to cereal products."

From the laboratories of the Monsanto Chemical Company in St. Louis, Missouri, will come a comprehensive treatment of "Chemical leavening agents." In all, three papers will be presented on this subject by R. P. Languth, T. P. Kichline, N. C. Nielsen, and others. C. W. Blessing *et al.* of the U.S.D.A. Northern Laboratories will report on the "Carotenoid content of the grain from yellow endosperm-type sorghums." From Pillsbury Mills, Inc., a paper by E. Haschka, J. Thornby, and G. Wittmer will suggest means for "Quality control of color uniformity." These and other contributions from leading cereal research laboratories do credit to this fine technical program.

Social Activities

Throughout the week, members and particularly their ladies will be wined, dined, and entertained (not to mention breakfasted and luncheoned) most hospitably. From Monday evening's President's Reception (punch and music), through Tuesday's view of Easter flowers at the Krohn Conservatory and Art Museum tour, then dinner and the informal Briar Hop (southern fried chicken, square and round dancing, etc.); Wednesday's tour to the Kentucky bluegrass country and race horse farms; Thursday evening's banquet with dancing; and Friday's visit to the Kroger plant—all week long, thanks to an enthusiastic and active Local Arrangements Committee, feminine convention guests will be regaled with the attractions and hospitality of Cincinnati and its surroundings.

Nutrition Foundation:

(Continued from page 56)

agencies, including the United Nations Children's Fund, the Food and Agriculture Organization, and the World Health Organization.

The members of the Nutrition Foundation are companies in the food industry and related industries. Membership commitments are made initially for a five-year period. Members are asked to renew their commitments

each year so that the Foundation will have working capital for advance planning.

Breadth of Representation

Each member company has a representative on the Board of Trustees. In order to have the Board at all times include adequate representation of the general public to assure its public character, representatives of the general public are elected by the Board for terms of one year. The Chairman of the Board must be a representative of the public. Now serving on the Board in this capacity, in addition to Chairman James R. Killian, Jr., President, Massachusetts Institute of Technology, are Leroy E. Burney, Surgeon General, U. S. Public Health Service; Lee A. DuBridge, President, California Institute of Technology; the Reverend Theodore M. Hesburgh, President, University of Notre Dame; Herman E. Hilleboe, Commissioner of Health, New York State; Frederick L. Hovde, President, Purdue University; and Sidney Earle Smith, President, University of Toronto (now Canadian Secretary for External Affairs).

Each member company has a research or technical department representative on the Food Industries Advisory Committee to provide a direct technical liaison with the Foundation's work. This Committee meets annually with university scientists and representatives of government agencies for informal discussions of current research. Projects receiving Foundation support and studies of related interest are reviewed.

Foundation Officers

Officers of the Foundation for 1958 are James R. Killian, Jr., Chairman; Henry J. Heinz, II, President; Charles G. Mortimer, Vice President; Charles Glen King, Executive Director; and Horace L. Sipple, Executive Secretary and Treasurer.

The general and unqualified acceptance accorded the Nutrition Foundation's program by scientists, educators, and government officials may be regarded as a factor contributing materially to improved public, industrial, and governmental relations. It is the earnest desire of the Foundation to have its program aid the food and related industries as a whole in making a more efficient, more prompt, and greater contribution to human health through balanced, practical, and attractive diets.

SOME MICROSCOPIC CHANGES IN THE ALEURONE LAYER OF WHEAT DURING CONDITIONING¹

M. MOMTAZ EL-GINDY AND W. SCHAEFER, Federal Research Institute of the Cereal Industry, Detmold, Germany

THE PROBLEM of wheat conditioning has received much attention from industry and from cereal chemists during the past few years. Some of the most important principles have been summarized by Schaefer (2,3). Facilitation of the separation of bran from endosperm and consequent improvement in baking strength of the flour, resulting from lower contamination with branny material, are considered to be the two main objectives of wheat conditioning. In practice, three variables affect the physical state of the wheat kernel during conditioning: moisture content of the kernel, conditioning temperature, and duration of conditioning. From the milling standpoint, a suitable moisture differential between bran and endosperm should be reached. This can be attained during penetration of moisture into the wheat kernel, which occurs rapidly at first through the germ, then more slowly along the hyaline layer to the tip of the kernel, and finally into the endosperm.

Optimum specifications for conditioning soft wheats are known to differ from those for hard wheats. It has been assumed, however, that in both wheats the penetration and transfer of water is caused by some osmotic phenomenon taking place in the cells of germ and aleurone, which causes swelling and contraction of proteins. As a result of heat-conditioning, the viscous fluid of the aleurone cells changes to a friable solid. This changes the normal cushioning action of the untreated aleurone layer, which prevents the impact of the roll corrugations from being fully effective, and consequently a better separation can be expected. The change in the consistency of the contents of the aleurone cells alters the ability of the cells to stain with neutral red indicator solution. Microscopic determination of the depth of staining of the aleurone cells with neutral red can therefore be used for investigating the course of conditioning. This test was used in the present study for comparing dry heating with steam heating of German soft wheat.

A further objective of the study was to explore the possible extension of the staining test. It is common in Germany to set the price of wheat lots on the basis of their moisture content and the "besatz" analysis (dockage and foreign material), in which the "heat-damaged" kernels are separated. It was considered possible that a color test might be practical for evaluation of the degree of severity of heat damage.

A German soft wheat, Breusteds Werla variety, was used throughout the study.

Procedure

For dry heating, samples at 12% and at 20% moisture content were heated electrically in metal containers at 40°, 50°, 60°, and 70°C., for periods of 30, 60, and 90 minutes at each temperature. The Elcon apparatus shown in Fig. 1 was used for heating the samples.

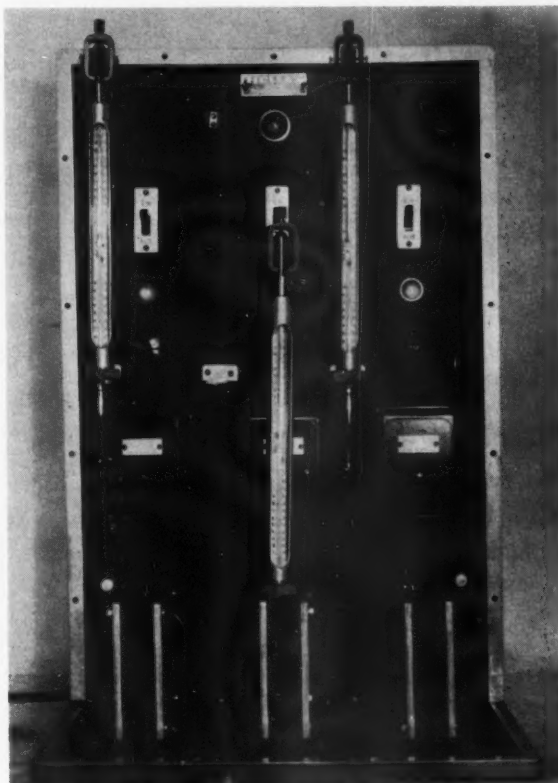


Fig. 1. Apparatus used for applying dry heat to kernels in metal containers.

For steam-conditioning, the samples were heated for 30 seconds at 40°, 50°, 55°, 60°, 65°, and 70°C. The apparatus used is shown in Fig. 2. Steam passed from the generator into the closed cabinet containing the wheat. The

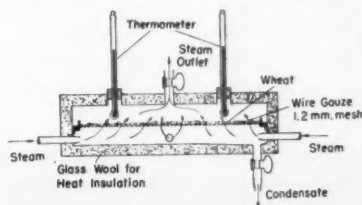


Fig. 2. Apparatus used for steam-conditioning. A, generator; B, closed cabinet containing wheat; C, manometer.

¹ Manuscript received December 16, 1957.

pressure at the given temperature is shown by a manometer.

Representative kernels of each sample were sectioned. The sections were allowed to swell in distilled water for 30 minutes, then stained for 10 minutes in a solution of pH 6.9 composed of 2 ml. of 0.1% neutral red solution, 2 ml. distilled water, and 0.305 ml. of phosphate buffer solution. The stained sections were transferred to distilled water for 30 seconds, after which they were examined microscopically. The pH 6.9 was chosen after an investigation of the effect of ten different pH values in the range between 4.4 and 7.2. A slight gradual increase in color intensity was observed microscopically as the pH was increased. This change is almost imperceptible in photomicrographs (Fig. 3). More recently, some interesting

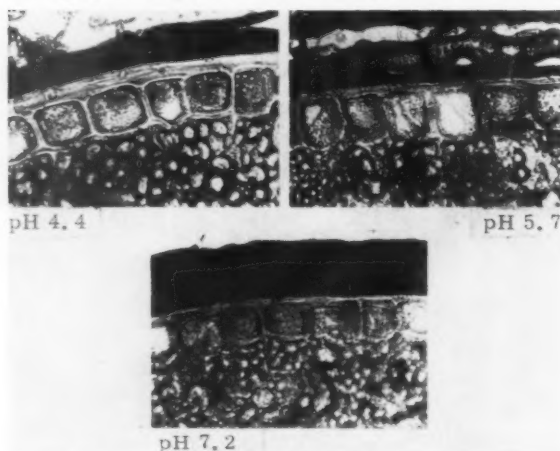


Fig. 3. Effect of pH on intensity of staining of the aleurone layer with neutral red.

modifications of the staining method have been proposed by Janicki (1).

Effect of Temperature and Duration of Conditioning on Staining

At a moisture content of 12%, the aleurone layer of wheat conditioned at 40° and at 50°C. stained only lightly. It made no difference whether the wheat was heated for 30, 60, or 90 minutes. When the heating was at 60° or 70°C., however, staining was darker as the period of heating was increased (Fig. 4). The darkest staining was never observed in wheat treated at temperatures below 70°C. That is, while both temperature and duration of heating are factors affecting the subsequent depth of staining of the aleurone layer, the effect of the latter does not appear until a critical temperature is reached.

According to Strugger (5) and Schneider and Hoffmann-Walbeck (4), the effect of temperature on subsequent staining of the aleurone and other cells is chiefly the result of the effect of heat on the lipoid-protein complexes.

Effect of Moisture Content of Wheat on Staining of the Aleurone Layer after Conditioning

The influence of temperature was found to be more pronounced the higher the moisture content of the wheat

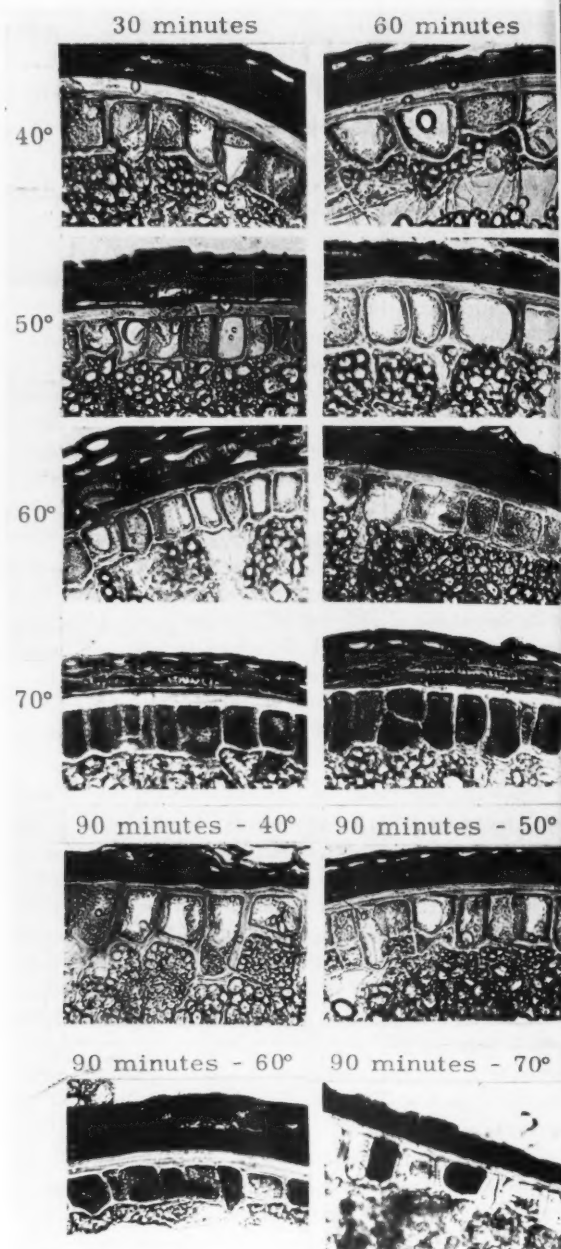


Fig. 4. Effect of temperature and duration of heating on the intensity of subsequent staining of the aleurone cells.

(Fig. 5). After conditioning at the same temperature, the aleurone layer of wheat at 12% moisture content gave a lighter color than that of wheat at 20% moisture content. Similarly, when steam-conditioning was used, a dark color was obtained at lower temperatures than when dry heat was used (Fig. 6). This is because moisture penetrates into the hull of the kernel during steam-conditioning. Apparently, combined treatment with heat and moisture, as in steam-conditioning, is preferable to heat-treatment alone for bringing about the desired changes in the cell walls and contents.

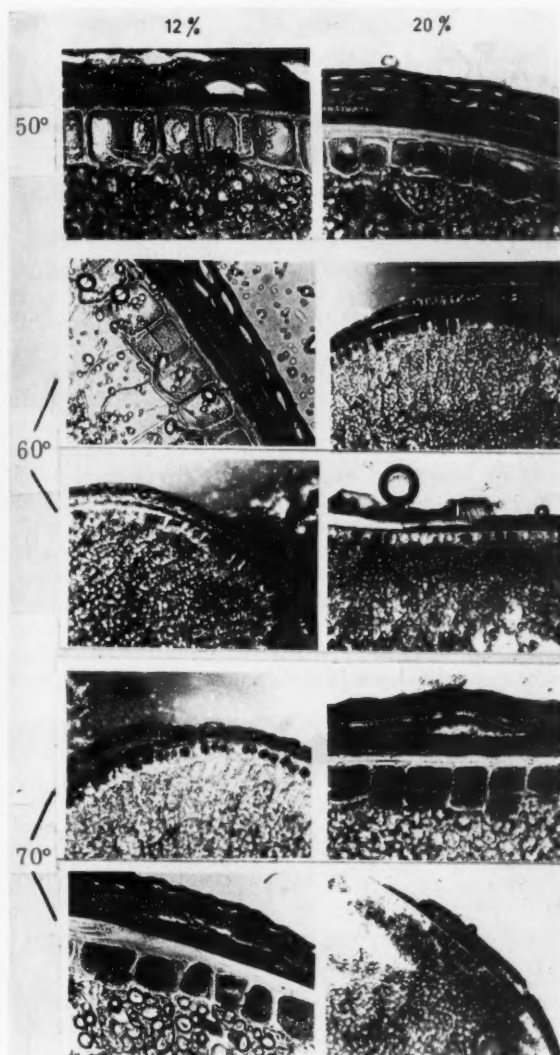


Fig. 5. Effect of the moisture content of the wheat on the intensity of staining of the aleurone cells after heating.

Since the staining test is so sensitive to the temperature attained by the wheat and to its moisture content, it might

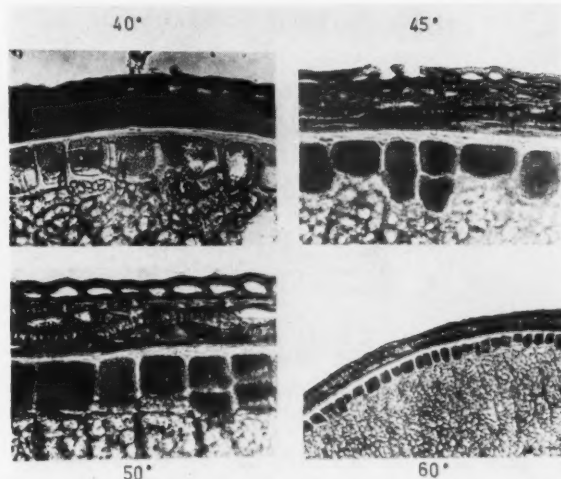


Fig. 6. Influence of temperature during steam-conditioning on the subsequent intensity of staining of the aleurone cells.

be practical to test in this manner for kernels that have suffered damage through heating in bins or through exposure to high temperature during drying. The neutral red staining method is both simple and relatively rapid.

Summary

Coloration of the wheat aleurone layer by neutral red has been shown to be affected by the pH of the staining solution, the temperature attained during dry heating, the length of time of heating at high temperatures, and the moisture content of the wheat. An effect of moist heat could not be observed; this indicates a superiority of the steam-conditioning system over the dry heating system. The possibility of extending the color test to detection of heat damage resulting from storage and drying is indicated.

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3. SCHAEFER, W. *Die Mühle* 91: 558 (1954).
4. SCHNEIDER, F., and HOFFMANN-WALBECK, H. P. *Zucker-Beihefte, Heft 5* (1952).
5. STRUGGER, S. *Protoplasma* 24: 108 (1935).

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BAKING TECHNOLOGY

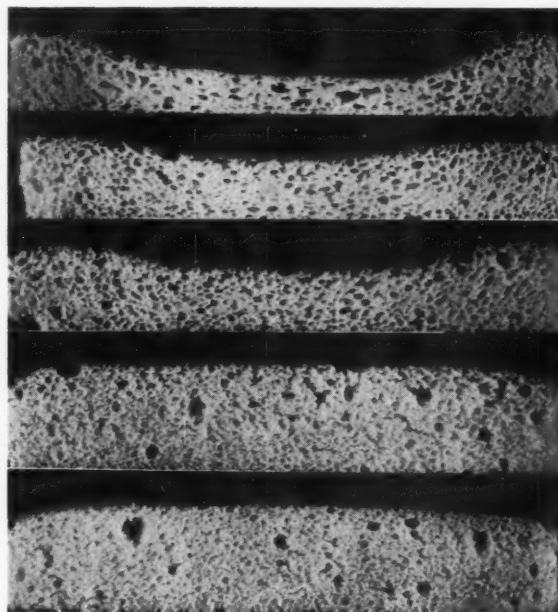


Silicones May Affect Cake Quality

Frequently technological progress in one area brings problems in another. Developments in silicone chemistry have made possible new products ranging from "bouncing putty" to heat-resistant oils, rubberlike compounds, and amazingly efficient foam depressants.

Our laboratory has traced baking failures in whole-egg cakes to the presence of mere traces of certain silicone compounds. These were found to have been introduced into the cakes through packaging materials or shortenings. Silicone release agents, used in the fabrication of plastic films used for packaging, or silicone oils used to impart special properties to paper in multiwall bags can be responsible for contamination of flour, sugar, cocoa, dried milk, or other cake ingredients. Equally troublesome can be contamination of shortening as a result of intentional addition of silicone defoamers or contact with silicone-type valve lubricants.

That the small quantities likely to get into a cake by the routes described can have a significant effect upon cake quality is shown in the accompanying illustration of



the effect of silicone oil on yellow cake batters. In the top four cakes respectively, cc. per million g. batter: 1.2, 0.24, 0.6, and 0.12. Bottom cake is the control.

Of course the term "silicone" describes a wide variety of compounds having many different structures and functional properties. It should not be assumed that all are harmful to baking quality of cakes. We believe our observations show the importance of careful checking before permitting the use of any of these compounds in an application that may permit even trace amounts to find their way into a cake. Furthermore, we think suppliers of pack-

aging materials, and cake ingredients, as well as bakers should be aware of the effects that may result from contamination with certain surface-active compounds.

P. E. RAMSTAD, *General Mills, Inc.*

the President's Corner



news of the association

The President-Elect

For the first thirty-one years of its existence the American Association of Cereal Chemists functioned under the guidance of its president and vice-president, both elected by ballot at the business session at the annual meeting. The president was chairman of the Executive Committee and the vice-president was empowered to act for the president in his absence. The vice-president usually moved up to the presidency the following year.

Election of officers by mail ballot was approved at the 1946 annual meeting, and the Constitution was amended to provide for the post of president-elect instead of vice-president. At the same time, the duties of the president-elect were spelled out in detail. T. R. Aiken has commented in his review, "AACC Administrative Officers, 1930-31 to 1954-55":

The new system of electing officers made it possible for the president-elect to prepare the groundwork for his administration a year in advance, and become familiar with the handling of the Association's business as chairman of the executive committee.

With incorporation of the AACC in 1956, it became necessary, under the Laws of Incorporation of the State of Minnesota, for the president to assume the chairmanship of the Board of Directors, with the president-elect designated as vice-chairman, to preside in the absence of the president.

As the By-Laws of the Association now stand, the president-elect becomes president at the close of the one-year term of the president. In the event of a vacancy in the office of the president, the president-elect moves up. The president-elect is consulted by the president concerning the choice and appointment each year of two active members of the Association as members of the Board of Directors. The president may, at his discretion, delegate duties to the president-elect.

Bills of the Association shall not be paid without the approval of the president or president-elect, and all checks issued shall be countersigned by the president or president-elect, as well as the treasurer.



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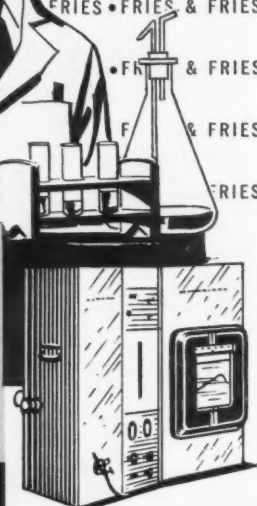
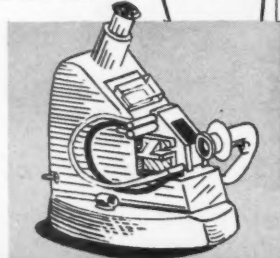


SHEFFIELD CHEMICAL

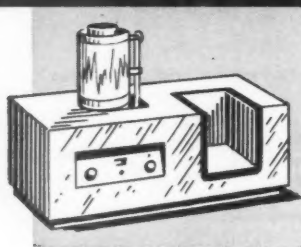
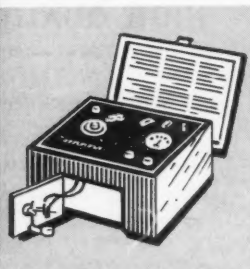
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The president-elect, along with the president, treasurer, secretary, and retiring president, has the same rights, privileges, duties, liabilities, and authority as the elected or appointed board members.

These are the duties of the president-elect. I like to characterize the office as that of president-in-waiting. It is the job of the president-elect to observe, to plan, to look for opportunities to help the president and other officers, to look around for men who can work effectively in the building up of the Association—in short, to do everything in his power to build this great Association of ours to even greater heights.

C. L. BROOKE

A.A.C.C.

LOCAL SECTIONS

Chesapeake Section attended a dinner meeting on January 30 at the Log Lodge, Agricultural Research Center, Beltsville, and heard H. D. Bruner, U. S. Atomic Energy Commission, speak on "Use of radio isotopes in biological investigations."

• • •

Midwest Section on February 4 met at the Builders Club, Chicago. Kenneth Calhoun, American Institute of Baking, who has worked on the value of breads as judged by animal-feeding tests and on the assay of wheat and wheat products, discussed the assay methods found most successful and gave some results of a survey the American Institute of Baking is currently conducting.

New officers elected were Robert Koch, chairman; Edward Feigon, vice-chairman; and Tod Stewart, secretary-treasurer. The next meeting will be held March 3, and the speaker will be James Ingle, Food Materials Corporation.

• • •

Nebraska Section held its March 1 meeting in the Castle Hotel, Omaha. Paul J. Mattern and R. M. Sandstedt, College of Agriculture, discussed "Some aspects of fermentation tolerance."

• • •

Niagara Frontier Section held its President's Meeting on February 10 in Buffalo, and welcomed AACC National President William B. Bradley.

• • •

Northwest Section met at noon, February 28, at Dayton's Sky Room, Minneapolis. Byron D. Smith, of Remington Rand Univac, spoke on "The electronic computer as a tool of management, engineering, and research."

• • •

Pacific Northwest Section appointed B. Lynn Speak-er as program chairman and Don Pitts, Don Sundberg, and Joe DeHaan as committee members for the annual convention to be held June 23-24, 1958, in Spokane.



... People

Robert Allen now on the USDA staff at Washington State College, Pullman.

Robert M. Arnell transferred from Ogden, Utah, to Stockton, Calif., as chief analytical chemist for Sperry Division, General Mills.

Gary R. Bahr joins the product research department, foods division, Procter & Gamble.

Edward G. Bassett joins research staff of Takamine Laboratory of Miles Labs, Clifton, N. J., as special enzyme scientist.

Charles J. Bates joins the development department of the foods division of Procter & Gamble.

Thomas A. Bruce appointed by Corn Products as assistant to the general sales manager.

George V. Caesar, recently retired director of starch research for Huron Milling Co., sets up consulting practice in Harbor Beach, Mich.

Paul J. Cardinal promoted to vp in charge of industrial relations, Hoffmann-La Roche, Nutley, N. J.

Stephen S. Chang from Swift to A. E. Staley research staff as senior research chemist in edible oils.

Floyd Claypool assumes new duties with Crown-Centennial, Portland, Ore., and also retains position as head of the products control department.

Walter W. Cochran joins the flour milling service division of Wallace & Tiernan, Kansas City, Mo.

W. J. Goodrum named senior chemical engineer in research division at Spencer Kellogg & Sons, Buffalo, N. Y.

R. W. Hayes named marketing director, general products department, Merck & Co., Rahway, N. J. Also appointed to the department are **R. G. Valerio**, industrial products manager; **J. W. Kennady**, plant products manager; **R. B. Pace**, sales manager of manufacturing and governmental accounts; and **J. A. Mc-**

Groarty, market development manager.

Calvin Konzak appointed to the Agronomy Department, Washington State College, replacing **Fred Elliot**.

William J. Lane to **H. Kohnstamm** as sales representative in the western Pennsylvania and West Virginia territories.

J. E. McCabe now marketing director, agricultural products department; **J. R. Warren**, sales manager; **D. K. Richards**, agricultural products manager; and **D. G. Stephen**, animal health products manager, Merck & Co.

Michael D. Mullin promoted to director of bulk product sales, Corn Products Refining, succeeding **Edward W. Schmitt**, who is retiring after 46 years with the company.

Robert W. Smith from sales manager to general manager, vitamin division, Hoffmann-La Roche.

George Trum transferred from Russell-Miller in Buffalo to company headquarters in Minneapolis.

Howard Zimmer appointed sales representative of **H. Kohnstamm** in Washington and Oregon.

... Products

Instant starches form the basis for many instant foods such as puddings and pie fillings, says the American Maize-Products Co., Ro-by, Indiana. Food processors use them in cake and other pastry mixes and in cereals. They have many future uses because of their gelling and thickening properties.

Catalog L-117, of the Bausch & Lomb Optical Co., contains information on lenses, prisms, and reflectors, quartz, and other special optical parts that will simplify describing optical needs. Write to Bausch & Lomb, Rochester 2, N. Y.

Du Pont announces two new high-yield types of "K" cellophane, 300 K-201 and K-202. K-201 was developed primarily for baked

foods, and offers excellent package appearance and longer product protection. K-202 was designed for bag fabrication, and logical uses include packaging of nuts, potato chips, candy, popcorn, bread, cake, sweet doughs, crackers and biscuits, and paper products.

Tote System Inc., Beatrice, Nebr., now optionally furnish Tote discharge equipment scale platforms. Material can be automatically weighed from Tote Bins directly into processing, facilitating proper blending and batch weighing for bulk installations.

A revised bulletin on the Richmond-Sprout-Waldron Gyro-Lab Sifters gives design, construction, and operating data for Model 100 and Model 100-M. Write for Bulletin 138-A, Publicity Department, Sprout-Waldron, Muncy, Pa.

Catalog LG-1, a 350-page, color-coded Pyrex brand laboratory glassware catalog, has been issued by Corning Glass Works, and is available on request on company letterhead from the Laboratory Glassware Sales Department, Corning, N. Y. In six sections, the book describes more than 9,000 items, and contains the most complete listing of borosilicate glass chemical ware and apparatus ever printed.

A new bulletin on the design, engineering, and construction of complete feed-processing plants has been released by Sprout, Waldron & Co., Muncy, Pa. It provides flow diagrams and basic operating data for both a 30-ton per hour broiler feed mill and a 45-ton per hour egg-laying feed mill. Ask for Bulletin 181.

Equipment for handling hazardous materials safely is described in a recent folder available from S. Blickman, Inc., 8400 Gregory Ave., Weehawken, N.J. Illustrated are 26 different technical enclosures for the safe handling of all types of contaminants.

An Electro-Caloric Flow Meter for measurement and control of the mass rate of flow of liquids (Industrial Development Labs. Inc., Jersey City, N. J.) utilizes the rate of heat transfer through the boundary layer of a liquid to obtain a measurement of flow. It is suited for corrosive fluids and gases, slurries,

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PAGE 68 • CEREAL SCIENCE TODAY

hydrocarbons, biologics, beverages, etc., and has many applications in the chemical, pharmaceutical, and food processing industries. Its linear scale covers a range of flows including pulsating ones. The measuring elements are not exposed to the fluid, and there is no pressure loss nor danger of clogging. The device is fully electronic without mechanically moving parts. For remote indication and control a directly produced electric signal is available. The manufacturer claims that it meets the most stringent sanitary and safety requirements.

An innovation in pellet-cooling equipment and an aid to custom millers is the Rotaircool, operating with any type of pelleter. Pellets are picked up and drawn by air into a cooler cage rotating on a central drive shaft, where they hit a stationary wear cylinder, lose their velocity, and drop into the revolving cage. Fresh air passes through the pellets and the hot air is drawn from the central column and cooler bottom into the fan eye and directed to a collector, from where it escapes into the atmosphere. The unit can be fed by gravity from overhead bins or direct from bucket elevators when so required, but the pneumatic handling is recommended because of its clean, dustless operation and minimum pellet breakage. Low operating cost, small space requirement, and simplicity of operation are advantages of the Rotaircool. Write to Sprout, Waldron & Co., Inc., Muncy, Pa.

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The North Dakota Agricultural College has been given an annual grant of nearly \$50,000 by the Malt-ing Barley Improvement Association, Milwaukee. The money will be used to support barley research.

The Canadian Institute of Food Technology will meet for its first annual convention on June 12-13, 1958, in the new Queen Elizabeth Hotel in Montreal. Speakers from food technology industries will review the progress of their industries, and will discuss probable future trends that will affect the research worker and the supply of technically trained personnel. To receive a pre-registration form, write to J. H. Hulse, President-Elect, Canadian Institute of Food Technology, P.O. Box 62, Postal Station "K", Toronto 12, Ontario.

The Millers' National Federation will hold its 1958 convention on

April 21-23 in the Shoreham Hotel, Washington, D. C. Senator Frank Carlson, Kansas, and Representative Harold D. Cooley, North Carolina, will discuss farm legislative prospects and possibilities. Gwynn Garnett, administrator of the Foreign Agricultural Service, and Earl B. Smith, director of the office of transportation for the U. S. Defense Department, will also speak. Requests for room reservations should be made to Fred H. Me-whinney, 847 National Press Bldg., Washington 4, D. C.

The Arbeitsgemeinschaft Getreideforschung e. V. have scheduled the following meetings for 1958:
April 22-25—Starch Conference
May 21-23—Wheat-Breeding Conference

June 10-12—Cereal Chemists' Meeting

September 16-18—Bakers' Conference

October 8-10—Millers' Conference
The meetings will be held in Detmold, Germany, and an invitation has been extended to all interested parties.

The Sheraton-Cadillac Hotel, Detroit, will be the meeting place for the 1958 convention of the American Society of Brewing Chemists from May 4-8. General chairman Howard Noffze and his committees announce plans for business meetings, technical sessions, entertainment, and tours to Greenfield Village, the Henry Ford Museum, and the Ford Motor Company at River Rouge. For further information, write to Frank Roberts or Herman K. Rosenbusch, 909 E. Elizabeth Street, Detroit 26.

EMPLOYMENT NOTICES

LABORATORY SUPERVISOR QUALITY CONTROL

Experienced man to supervise and administrate quality control laboratory in prepared mix plant. Experience involving supervision required. Prefer B.S. education. REPLY TO: BOX 211, Cereal Science Today, University Farm, St. Paul 1, Minn.

MANUFACTURING PROCESS ENGINEER

Experienced man to work in food plant analyzing mfg. processes for improvement and/or change. Engineer with B.S. desired or experience with undergraduate engineering education. REPLY TO: Box 58, Cereal Science Today, University Farm, St. Paul 1, Minn.

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